

**REMARKS**

This Amendment is filed in response to the Office Action dated April 3, 2006. This application should be allowed and the case passed to issue. No new matter is raised by this amendment. The amendment to claims 9 and 14 are supported throughout the specification. The amendment to claim 20 is supported by claims 14, 15, and 16.

Claims 1-20 are pending in this application. Claims 1-8 and 14-19 have been withdrawn, pursuant to a restriction requirement. Claims 9-13 and 20 have been rejected. Claims 9, 14, and 20 are amended.

***Restriction***

Applicants traverse the restriction because Groups III and II are improperly characterized as an intermediate-final product relationship. According to the MPEP, "[t]ypically the intermediate loses its identity in the final product" MPEP § 806.05(j). The Examiner has not shown that the claimed material of Group III loses its identity in the recording medium of Group II. Therefore, Groups III and II have been improperly characterized as an intermediate-final product relationship.

The Examiner argued that the above argument was not persuasive but the Examiner did not present any evidence that the Examiner's characterization of Groups III and II as an intermediate-final product relationship was proper.

Upon the allowance of the Group II claims, Applicants respectfully request rejoinder, examination, and allowance of the Group III claims (claims 14-19), as these claims are properly related to Group II in combination/subcombination relationship. Upon the allowance of the Group II claims, Applicants further respectfully request the rejoinder, examination, and

allowance of the Group I claims in accordance with the provisions of MPEP § 821.04, as these claims are related to the product claims as a method of making the product.

***Obviousness Double Patenting***

Claims 9-13 and 20 were rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,613,422. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

In response to the obviousness-type double patenting rejection based on U.S. Patent No. 6,613,422, Applicants will consider filing a terminal disclaimer upon the indication of otherwise allowable subject matter.

***Claim Objections***

Claim 20 is objected to as being dependent upon withdrawn claims. This objection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Claim 20 has been amended to include the limitations of claims 14, 15, and 16.

***Claim Rejections Under 35 U.S.C. § 102***

Claims 9-13 and 20 were rejected under 35 U.S.C. § 102(a) and/or (e) as being anticipated by Ma et al. (U.S. Patent No. 6,613,422). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Inventorship is the same in both the Ma et al. patent and the instant application. The instant application was filed less than one year from the publication of the Ma et al. patent. Thus, Ma et al. is not prior art to the instant claims under 35 U.S.C. § 102(a) and/or (e).

Claims 9-13 and 20 were rejected under 35 U.S.C. § 102(a) and/or (e) as being anticipated by Fujimaki et al. (U.S. Pub. Pat. App. No. 2003/0228496).

Claims 9-13 and 20 were rejected under 35 U.S.C. § 102(e) as being anticipated by Jairson et al. (U.S. Pat. No. 6,855,232).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the instant invention, as claimed, and the cited prior art.

An aspect of the present invention, per claim 9, is a recording medium comprising a substrate having at least one surface and a stacked plurality of thin film layers on the at least one surface thereof. The layers include at least one magnetic or magneto-optical (MO) recording layer. A protective overcoat layer is on an outer surface of an outermost layer of the stacked plurality of thin film layers. The protective overcoat layer comprises a first sub-layer layer ( $c_1$ ) of undoped tetrahedral amorphous carbon (ta-C) having a high mass density of carbon (C) atoms greater than about 2.5 gms/cm<sup>3</sup> on the outer surface of the outermost layer of the stacked plurality of thin film layers. A second sub-layer ( $c_2$ ) of nitrogen-doped tetrahedral amorphous carbon (ta-C:N) having a high mass density of carbon (C) atoms greater than 2.0 gms/cm<sup>3</sup> is on the undoped ta-C layer.

Another aspect of the invention, per claim 20, is a recording medium comprising a stack of thin film layers on a substrate and a protective overcoat layer formed of a hard, dense, and abrasion and corrosion resistant material. The material comprises a first region of undoped tetrahedral amorphous carbon (ta-C) having a high mass density of carbon (C) atoms greater than about 2.5 gms/cm<sup>3</sup> and a second region of nitrogen-doped tetrahedral amorphous carbon (ta-C:N) having a high mass density of carbon (C) atoms greater than 2.0 gms/cm<sup>3</sup>. The nitrogen-to-carbon ratio (N/C) of the second region is up to about 0.3. The first region forms a first sub-

layer and the second region forms a second sub-layer stacked on the first sub-layer and the first sub-layer is formed in contact with an outermost layer of the stack.

The Examiner asserted that Fujimaki et al. and Jairson et al. disclose a recording medium comprising the claimed first sublayer of undoped tetrahedral amorphous carbon having a mass density of carbon atoms greater than about 2.5 g/cm<sup>3</sup> on the stacked plurality of thin film layers and a second sublayer of nitrogen-doped tetrahedral amorphous carbon having a mass density of carbon atoms greater than about 2.0 g/cm<sup>3</sup>.

Fujimaki et al. and Jairson et al., however, do not anticipate the claimed recording medium because Fujimaki et al. and Jairson et al. do not disclose the second sublayer of nitrogen-doped tetrahedral amorphous carbon (ta-CN) having a mass density of carbon atoms greater than 2.0 g/cm<sup>3</sup>, as required by claims 9 and 20.

As disclosed in Ma et al. (column 3, line 65 to column 4, line 4 and Fig. 2) doping a tetrahedral amorphous carbon layer with nitrogen causes a reduction of the carbon density. Applicants have discovered that forming the ta-CN layer by a filtered cathodic arc deposition process allows the formation of a high mass density of carbon atoms greater than 2.0 gms/cm<sup>3</sup> (page 14, line 10 to page 15, line 28).

While Fujimaki et al. disclose a tetrahedral amorphous C layer formed by filtered arc cathode deposition, Fujimaki et al. disclose the nitrogen-containing carbon film is formed by magnetron sputtering (paragraphs [0049], [0057], [0062], and [0064]). Therefore, nitrogen-doped carbon films according to the method of Fujimaki et al. cannot achieve the density greater than 2.0 g/cm<sup>3</sup>, as required by claims 9 and 20. Fujimaki et al. further disclose that a carbon film formed by sputtering has a density of 2.0 g/cm<sup>3</sup> (paragraph [0039]). In light of the teaching of

Ma et al., it would be expected that a nitrogen-doped sputtered film would have a density less than 2.0 g/cm<sup>3</sup>.

While Jairson et al. disclose that the second carbon layer has a density lower than 2.1 g/cm<sup>3</sup>. Jairson et al. further disclose that the second carbon layer typically has a density of 1.8 g/cm<sup>3</sup>. Jairson et al. do not disclose a **nitrogen-doped carbon** layer having a density in the range of greater than 1.8 g/cm<sup>3</sup> and lower than 2.1 g/cm<sup>3</sup>. Further, Jairson et al. disclose that the nitrogen-doped carbon layer is formed by sputtering. As explained above, sputtered nitrogen-doped carbon layers do not achieve a density greater than 2.0 g/cm<sup>3</sup>, as required by claims 9 and 20.

The attached graph (Appendix 1) illustrates the inability of a sputtered amorphous nitrogen doped carbon film to achieve a carbon density of 2.0 g/cm<sup>3</sup>. As shown in the graph, as the nitrogen content of the amorphous doped carbon film increases the carbon density of the film decreases. The carbon density of the undoped carbon film, as shown in the graph, is about the same as the 1.8 g/cm<sup>3</sup> value reported by Jairson et al.

In view of the teachings of Ma et al., Fujimaki et al. and Jairson et al., and the data in the graph, it is clear that the sputtered amorphous nitrogen doped carbon films have a mass density of carbon atoms less than the greater than 2.0 g/cm<sup>3</sup> required by the instant claims.

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-Lok Ltd.*, 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321

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(Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). Because Fujimaki et al. and Jairson et al. do not disclose the second sublayer of nitrogen-doped tetrahedral amorphous carbon (ta-CN) having a mass density of carbon atoms greater than 2.0 g/cm<sup>3</sup>, as required by claims 9 and 20, they do not anticipate claims 9 and 20.

Applicants further submits that Fujimaki et al. and Jairson et al., whether taken alone, or in combination do not suggest the claimed recording medium.

The dependent claims are allowable for at least the same reasons as claim 9, and further distinguish the claimed recording medium.

In view of the above amendments and remarks, Applicant submits that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX 1

